



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,881	05/13/2005	Kia Silverbrook	MJT005USNP	8850
24011 7590 03/22/2007 SILVERBROOK RESEARCH PTY LTD 393 DARLING STREET BALMAIN, 2041 AUSTRALIA			EXAMINER STEPHENS, JUANITA DIONNE	
			ART UNIT 2853	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/22/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/534,881

Applicant(s)

SILVERBROOK, KIA ET AL.

Examiner

Juanita D. Stephens

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Application filed 5/13/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/13/2006, 5/13/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgement is made of the Information Disclosure Statement filed 11/13/2006 and 5/13/2005.

Specification

2. The disclosure is objected to because of the following informalities:

The "CROSS-REFERENCE TO RELATED APPLICATIONS" section is missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-6, 8, 16-19, 21-22, 24, 32-37, 39 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by Kubby (US 5,706,041).

Kubby discloses a method of ejecting a droop of an ejectable liquid from a printhead and a printer system incorporating said printhead, comprising: **1)** a plurality of nozzles (col 3, lns 13-15), **2)** at least one heater element (col 3, lns 64-68) corresponding to each nozzle, wherein each heater element is in the form of a suspended beam(18) (col 3, lns 50-53), arranged for being suspended over at least a portion of a bubble forming liquid so as to be in thermal contact therewith, and each heater element configured to heat at least part of the bubble forming liquid to a

Art Unit: 2853

temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element (col 3, Ins 64-68), **3)** being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle (Fig. 5), **4)** wherein the bubble forming liquid (ink) and the ejectable liquid (ink) are of common body of liquid (common to inkjet printheads utilizes heaters), **5)** wherein each heater element is in the form of a cantilever beam (18) (col 3, Ins 50-51), **6)** configured to receive a supply of the bubble forming liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point, **7)** wherein each heater element has two opposite sides and is configured such that said gas bubble formed by that heater element is formed at both of said sides of that heater element (abstract; col 4, Ins 47-65; col 5, Ins 8-16), and **8)** wherein each heater is substantially covered by a conformal protective coating, such that the coating is seamless (col 4, Ins 11-17).

The method of claims 33-37, 39 and 47 are disclosed in Kubby as discussed above with respect to the apparatus.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2853

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4, 7, 10-12, 20, 23, 26-28, 38, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,06,041) in view of Silverbrook (US 6,019,457).

Kubby discloses a method of ejecting a droop of an ejectable liquid from a printhead and a printer system incorporating said printhead, comprising: **1)** a plurality of nozzles (col 3, lns 13-15), **2)** at least one heater element corresponding to each nozzle, wherein each heater element is in the form of a suspended beam (col 3, lns 50-51), arranged for being suspended over at least a portion of a bubble forming liquid so as to be in thermal contact therewith, and each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element, **3)** being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle (Fig. 5), **4)** wherein the bubble forming liquid (ink) and the ejectable liquid (ink) are of common body of liquid (common to inkjet printheads utilizes heaters), **5)** wherein each heater element is in the form of a cantilever beam (col 3, lns 50-51), **6)** configured to receive a supply of the bubble forming liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble

Art Unit: 2853

forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point, **7)** wherein each heater wherein each heater element has two opposite sides and is configured such that said gas bubble formed by that heater element is formed at both of said sides of that heater element (abstract; col 4, lns 47-65; col 5, lns 8-16), and **8)** wherein each heater is substantially covered by a conformal protective coating, such that the coating is seamless (col 4, lns 11-17).

Kubby et al. does not disclose **1)** a page-width printhead, **2)** wherein each heater has an actuation energy of less than 500 nanojoules (nJ), **3)** wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element, **4)** a structure that is formed by chemical vapor deposition (CVD), said nozzles being incorporated in the structure, **5)** structure which is less than 10 microns thick, said nozzles being incorporated in the structure. Silverbrook at least teaches a page-width printhead (col 2, lns 19-20), wherein each heater (120) has an actuation energy of less than 500 nanojoules (nJ) (col 19, lns 8-10), wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element (as shown by the shape of the heater element 120 in Fig. 10-12), a structure (overcoat 142) that is formed by chemical vapor deposition (CVD) said nozzles being incorporated in the structure (col 8, lns 65-66), and a structure which is less than 10 microns thick, said nozzles being incorporated in the structure (col 9, lns 8-10). It would

Art Unit: 2853

have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby with the structure as taught to be old by Silverbrook for the purpose of providing mechanical strength to resist the shock of exploding or collapsing vapor bubbles and providing protection against the external environment.

The method of claims 38, and 41-43 are disclosed in Kubby in view of Silverbrook as discussed above with respect to the apparatus.

7. Claims 9, 25 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Feinn et al. (US 6,543,879 B1).

Kubby teaches the claimed invention, with the exception of the areal density of the nozzles relative to the substrate surface exceeding 10,00 nozzles per square cm of substrate surface. Feinn et al. discloses the areal density of the nozzles relative to the substrate surface exceeding 10,00 nozzles per square cm of substrate surface (abstract; col 16, lns 11-13). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby with the areal density as taught to be old by Feinn et al. for the purpose of improving resolution.

The method of claim 40 is disclosed in Kubby in view of Feinn et al. as discussed above with respect to the apparatus.

8. Claims 13, 29 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Komuro (US 4,965,594).

Kubby teaches the claimed invention, with the exception of the heater being formed on different layers. Komuro at least teaches an inkjet print head having a heater that is formed in a plurality of different layers (col 3, lns 35-65, as seen in Fig. 1). It

Art Unit: 2853

would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby by providing a heater that is formed in a plurality of different layers as taught to be old by Komuro for the purpose of enabling drops of different sizes to be ejected in order to produce a gradated recording.

The method of claim 44 are disclosed in Kubby in view of Komuro as discussed above with respect to the apparatus.

9. Claims 14, 30, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 65,706,041) in view of The Fabrication of Reliability Testing of Ti/TiN Heaters (DeMoor).

Kubby teaches the claimed invention, with the exception of each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50. DeMoor at least teaches that it is desirable to use a heater made of Ti/TiN (Ti has an atomic number of 22) in integrated MEMS systems (a thermal inkjet is such a system), because the material provide the advantages of CMOS fabrications (low cost and uniformity) in combination with a very high reliability (see Conclusion). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kubby by providing the Ti/TiN heater as taught to be old by DeMoor, for the purpose of providing advantages of CMOS fabrication in combination with high reliability.

The method of claim 45 is disclosed in Kubby in view of DeMoor as discussed above with respect to the apparatus.

Art Unit: 2853

10. Claims 15, 31, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubby (US 5,706,041) in view of Yamashita et al. (US 5,969,005).

Kubby teaches the claimed invention, with the exception of wherein each heater element is configured for a mass of less than 10 nanograms. Yamashita et al. at least teaches that the ink is jetted at an output of from 1 to 70 nanograms per droplet to effect recording (abstract, col 30, lns 29-32, lns 38-40; col 31, lns 18-22). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Kubby with the output of 1 to 70 nanograms per droplet to effect recording as taught to be old by Yamashita et al. for the purpose of providing a greater surface area of the droplet, thus strongly improving image quality.

The method of claim 46 is disclosed in Kubby in view of Yamashita et al. as discussed above with respect to the apparatus.

Contact Information

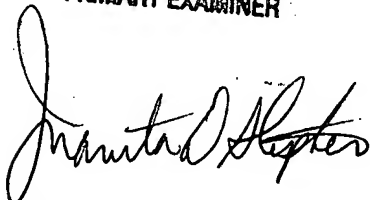
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex (Monday-Thursday 9:00 am -6:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JUANITA D. STEPHENS
PRIMARY EXAMINER



Juanita D. Stephens
Primary Examiner
Art Unit 2853

JDS
March 19, 2007